

Web accessibility

GUIDELINES



POLITECNICO
DI TORINO

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Summary

- Accessibility
- Standards
 - WCAG
 - WAI-ARIA
- Legge Stanca

The goal of accessibility

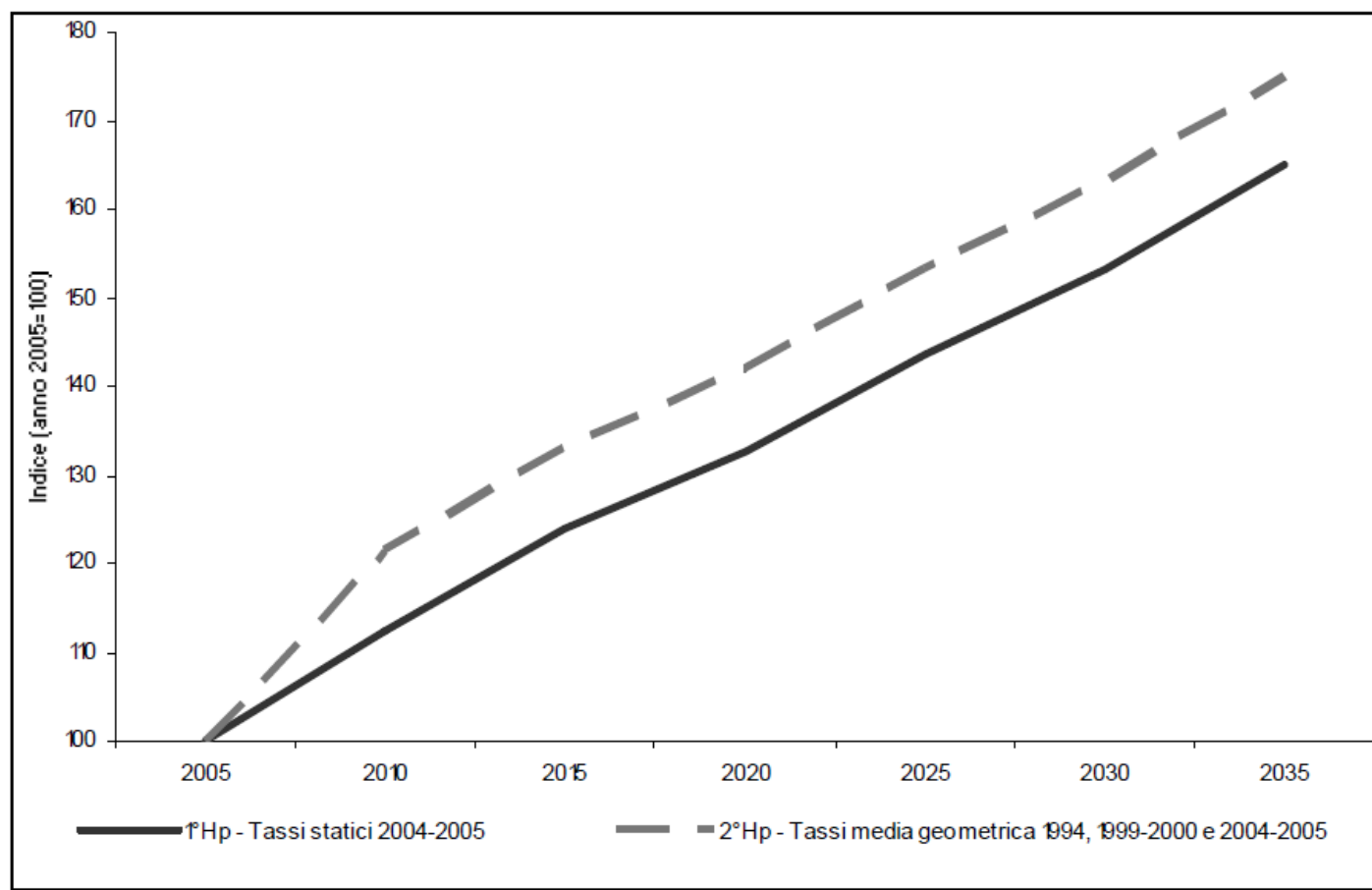
- Users with disabilities have access to and use of information and data that is comparable to that of users without disabilities
- Disabled users should be able to use a system
 - In the usual way like other users
 - Without particular difficulties
 - Without help of others

The target

- People with a physical or cognitive disability
 - Blind or visually impaired
 - Deaf or hearing impaired
 - Mobility or dexterity impaired
 - Reduced cognitive abilities
- Most disabled people became disabled as adults
- Elderly people often develop disabilities, e.g.
 - Reduced vision, reduced hearing
 - Reduced mobility or dexterity
 - Reduced tactile and fine motor abilities
 - Reduced short-term memory
 - Dyspraxia (difficulties to plan a task)
 - Dyslexia

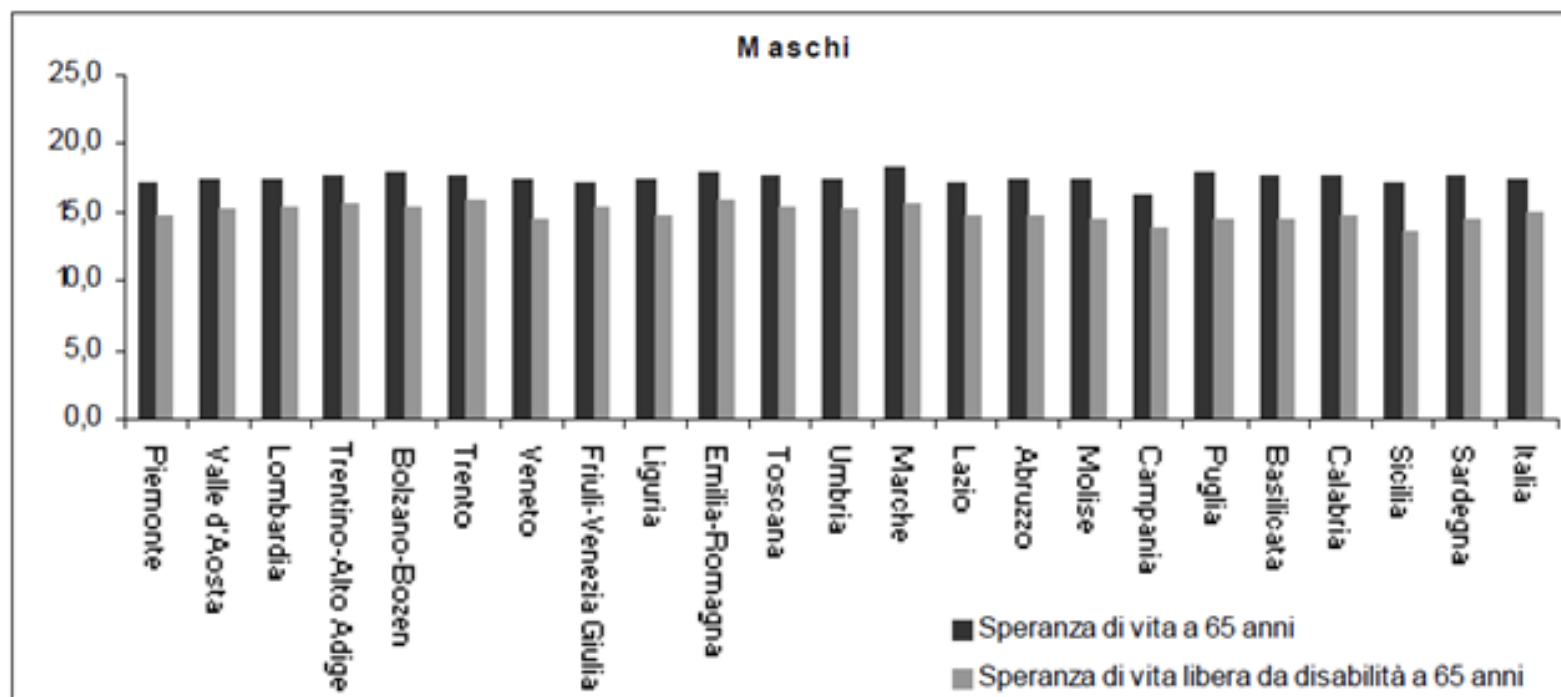
Data from ISTAT (2010)

Figura 1.4 - Proiezione del tasso di disabilità secondo le varie ipotesi - Anno 2005-2035 (Numeri indice anno base=2005)



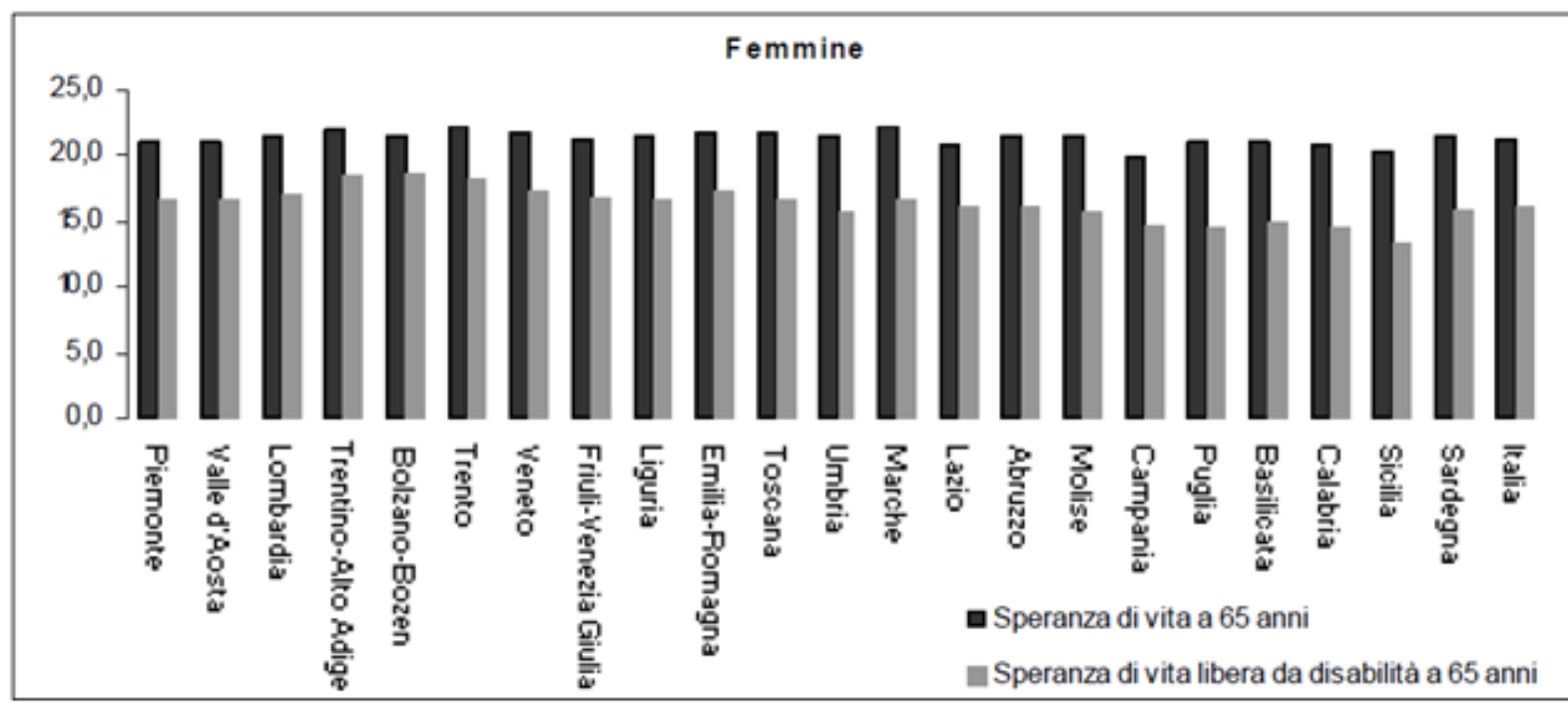
Data from ISTAT (2010)

Figura 2.2 - Speranza di vita (*stime 2005*) e speranza di vita libera da disabilità a 65 anni per regione e sesso - Anni 2004-2005



Data from ISTAT (2010)

Figura 2.2 - Speranza di vita (*stime 2005*) e speranza di vita libera da disabilità a 65 anni per regione e sesso - Anni 2004-2005



Who else could benefit?

- People with temporary disabilities (e.g., after an accident or stroke)
- Users in a context causing a temporary reduction of abilities (handicapping situation), such as
 - Noisy environment (similar to reduced hearing)
 - Hands engaged in other tasks (similar to reduced mobility)
 - Eyes engaged in other task (similar to reduced vision)
 - Attention on more important task (reduced cognitive capacity)
 - Limited hardware features of mobile devices, etc. (similar to various physical handicaps)

Why Web accessibility?

- Internet usage of disabled is higher than average!
 - “The Web is not a barrier to people with disabilities, it is the solution” (WebAIM.org)
- People who already use the Internet will continue to use it when becoming older, as long as it is accessible for them
 - eAccessibility is important for a large, increasing number of people!

A useful exercise

- Write a list containing several typical Web sites you use on every day base
- Describe a couple of usual routine tasks that you implement on each of these Web sites (looking for weather, news, buying a bus ticket, etc.)
- Now throw your mouse away and browse the Web doing what you usually do, and see how you get on with a task you are used too
- Make short notes on your experience and be ready to share it with others

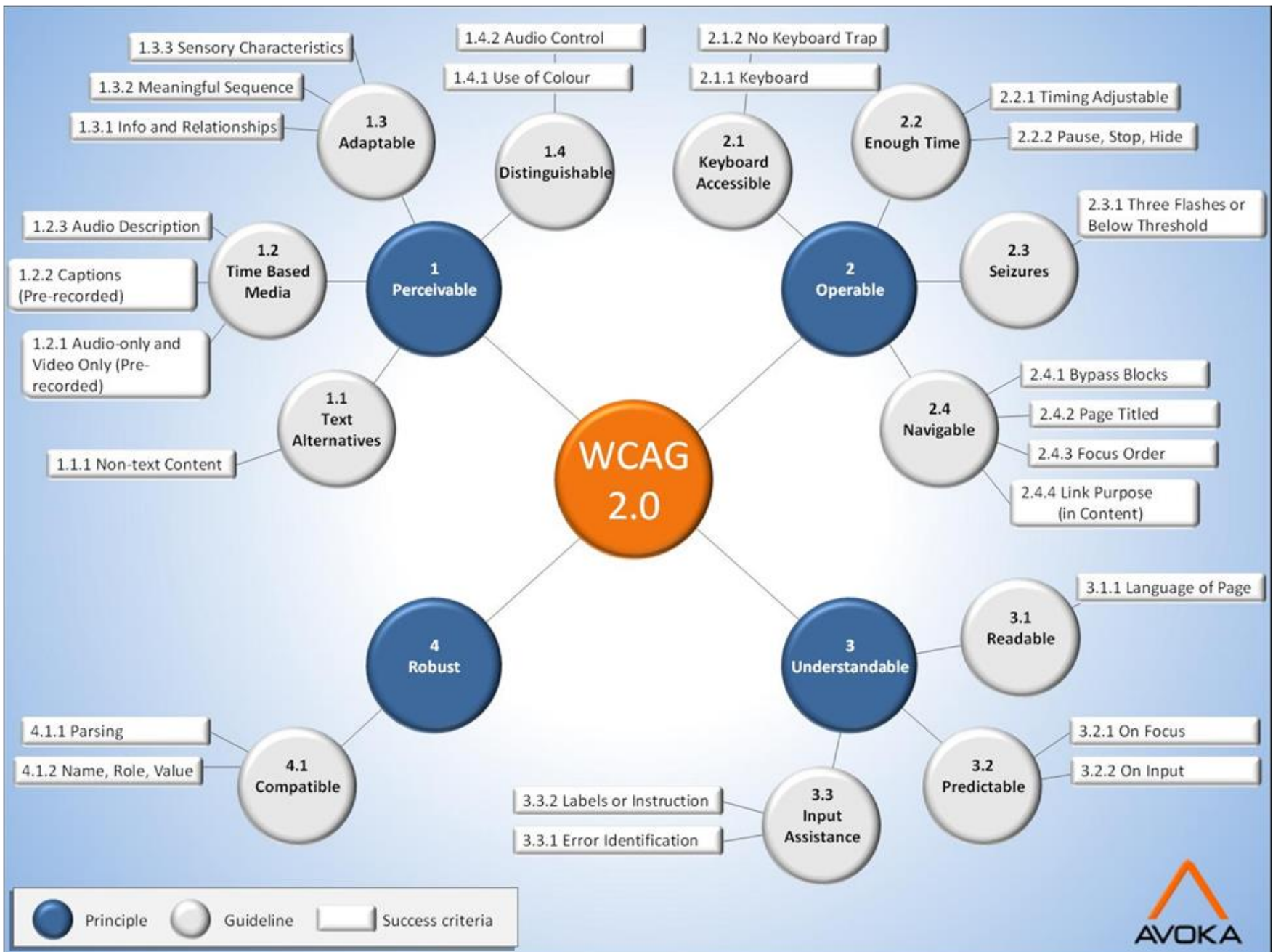
Standards for Web accessibility

- WCAG 2.0 (Web Content Accessibility Guidelines)
 - Guidelines and techniques for making websites and web applications accessible to people with disabilities
- WAI-ARIA (Accessible Rich Internet Applications Suite)
 - A framework for adding attributes to web documents in order to make actionable elements accessible to people using assistive technology
- UAAG (User Agent Accessibility Guidelines)
 - For web browsers and media players
- ATAG (Authoring Tool Accessibility Guidelines)
 - For software that creates websites

Web Content Accessibility Guidelines (WCAG) 2.0



- WCAG 2.0 (2008) defines how to make Web content more accessible to people with disabilities
- Several layers of guidance are provided including overall principles, general guidelines, testable success criteria and a rich collection of sufficient techniques, advisory techniques, and documented common failures with examples, resource links and code
- WCAG is part of an integrated suite of accessibility guidelines and specifications from the W3C WAI
 - WCAG, WAI-ARIA, ATAG, UAAG



WCAG 2.0 principles

- At the top are four principles (POUR) that provide the foundation for Web accessibility
 - Perceivable
 - Operable
 - Understandable
 - Robust

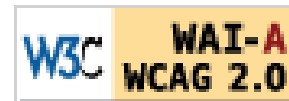
WCAG 2.0 guidelines

- Guidelines are under the principles
- The 12 guidelines provide the basic goals that authors should work toward in order to make content more accessible to users with different disabilities

WCAG 2.0 success criteria

- For each guideline, testable success criteria are provided to allow WCAG 2.0 to be used
- In order to meet the needs of different groups and different situations, three levels of conformance are defined

- A (lowest)
- AA
- AAA (highest)



WCAG 2.0 success criteria

Principles	Guidelines	Level A	Level AA	Level AAA
1. Perceivable	1.1 Text Alternatives	1.1.1		
	1.2 Time-based Media	1.2.1– 1.2.3	1.2.4– 1.2.5	1.2.6– 1.2.9
	1.3 Adaptable	1.3.1– 1.3.3		
	1.4 Distinguishable	1.4.1– 1.4.2	1.4.3– 1.4.5	1.4.6– 1.4.9
2. Operable	2.1 Keyboard Accessible	2.1.1– 2.1.2		2.1.3
	2.2 Enough Time	2.2.1– 2.2.2		2.2.3– 2.2.5
	2.3 Seizures	2.3.1		2.3.2
	2.4 Navigable	2.4.1– 2.4.4	2.4.5– 2.4.7	2.4.8– 2.4.10
3. Understandable	3.1 Readable	3.1.1	3.1.2	3.1.3– 3.1.6
	3.2 Predictable	3.2.1– 3.2.2	3.2.3– 3.2.4	3.2.5
	3.3 Input Assistance	3.3.1– 3.3.2	3.3.3– 3.3.4	3.3.5– 3.3.6
4. Robust	4.1 Compatible	4.1.1– 4.1.2		

Other WCAG 2.0 sections

- Sufficient and Advisory Techniques
 - An informative list of typical mistakes and good-practice techniques is provided
 - Techniques fall into two categories: those that are sufficient for meeting the success criteria and those that are advisory (optional)
- Common Failures
 - Describe authoring practices known to cause Web content not to conform to WCAG 2.0

Example

Principles	Guidelines	Level A	Level AA	Level AAA
1. Perceivable	1.1 Text Alternatives	1.1.1		
	1.2 Time-based Media	1.2.1–1.2.3	1.2.4–1.2.5	1.2.6–1.2.9
	1.3 Adaptable	1.3.1–1.3.3		
	1.4 Distinguishable	1.4.1–1.4.2	1.4.3–1.4.5	1.4.6–1.4.9
2. Operable	2.1 Keyboard Accessible	2.1.1–2.1.2		2.1.3
	2.2 Enough Time	2.2.1–2.2.2		2.2.3–2.2.5
	2.3 Seizures	2.3.1		2.3.2
	2.4 Navigable	2.4.1–2.4.4	2.4.5–2.4.7	2.4.8–2.4.10
3. Understandable	3.1 Readable	3.1.1	3.1.2	3.1.3–3.1.6
	3.2 Predictable	3.2.1–3.2.2	3.2.3–3.2.4	3.2.5
	3.3 Input Assistance	3.3.1–3.3.2	3.3.3–3.3.4	3.3.5–3.3.6
4. Robust	4.1 Compatible	4.1.1–4.1.2		

Example: 1. Perceivable

Principle 1: Perceivable - Information and user interface components must be presentable to users in ways they can perceive.

<https://www.w3.org/TR/WCAG20/#guidelines>

Guideline 1.1 Text Alternatives: Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.

[Understanding Guideline 1.1](#)

Guideline 1.2 Time-based Media: Provide alternatives for time-based media.

[Understanding Guideline 1.2](#)

Guideline 1.3 Adaptable: Create content that can be presented in different ways (for example simpler layout) without losing information or structure.

[Understanding Guideline 1.3](#)

Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background.

[Understanding Guideline 1.4](#)

Example: 1.4 Distinguishable

Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background.

[Understanding Guideline 1.4](#)

1.4.1 Use of Color: Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element. (Level A)

[How to Meet 1.4.1](#)
[Understanding 1.4.1](#)

Note: This success criterion addresses color perception specifically. Other forms of perception are covered in [Guideline 1.3](#) including programmatic access to color and other visual presentation coding.

1.4.2 Audio Control: If any audio on a Web page plays automatically for more than 3 seconds, either a mechanism is available to pause or stop the audio, or a mechanism is available to control audio volume independently from the overall system volume level. (Level A)

[How to Meet 1.4.2](#)
[Understanding 1.4.2](#)

Note: Since any content that does not meet this success criterion can interfere with a user's ability to use the whole page, all content on the Web page (whether or not it is used to meet other success criteria) must meet this success criterion. See [Conformance Requirement 5: Non-Interference](#).

Example: 1.4.1 Use of Colors

Sufficient Techniques

Note: Other techniques may also be sufficient if they meet the success criterion. See [Understanding Techniques](#).

Situation A: If the color of particular words, backgrounds, or other content is used to indicate information:

- G14: Ensuring that information conveyed by color differences is also available in text
- G205: Including a text cue for colored form control labels
- G182: Ensuring that additional visual cues are available when text color differences are used to convey information
- G183: Using a contrast ratio of 3:1 with surrounding text and providing additional visual cues on focus for links or controls where color alone is used to identify them

Situation B: If color is used within an image to convey information:

- G111: Using color and pattern
- G14: Ensuring that information conveyed by color differences is also available in text

Example: 1.4.1 Use of Colors

Advisory Techniques

- Conveying information redundantly using color (future link)
- C15: Using CSS to change the presentation of a user interface component when it receives focus

Failures

- F13: Failure of Success Criterion 1.1.1 and 1.4.1 due to having a text alternative that does not include information that is conveyed by color differences in the image
- F73: Failure of Success Criterion 1.4.1 due to creating links that are not visually evident without color vision
- F81: Failure of Success Criterion 1.4.1 due to identifying required or error fields using color differences only

Example

Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background.

[Understanding Guideline 1.4](#)

1.4.3 Contrast (Minimum): The visual presentation of text and images of text has a contrast ratio of at least 4.5:1, except for the following: (Level AA)

[How to Meet 1.4.3](#)
[Understanding 1.4.3](#)

- **Large Text:** Large-scale text and images of large-scale text have a contrast ratio of at least 3:1;
- **Incidental:** Text or images of text that are part of an inactive user interface component, that are pure decoration, that are not visible to anyone, or that are part of a picture that contains significant other visual content, have no contrast requirement.
- **Logotypes:** Text that is part of a logo or brand name has no minimum contrast requirement.

1.4.4 Resize text: Except for captions and images of text, text can be resized without assistive technology up to 200 percent without loss of content or functionality. (Level AA)

[How to Meet 1.4.4](#)
[Understanding 1.4.4](#)

1.4.5 Images of Text: If the technologies being used can achieve the visual presentation, text is used to convey information rather than images of text except for the following: (Level AA)

[How to Meet 1.4.5](#)
[Understanding 1.4.5](#)

- **Customizable:** The image of text can be visually customized to the user's requirements;
- **Essential:** A particular presentation of text is essential to the information being conveyed.

Note: Logotypes (text that is part of a logo or brand name) are considered essential.

Example

Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background.

[Understanding Guideline 1.4](#)

1.4.6 Contrast (Enhanced): The visual presentation of text and images of text has a contrast ratio of at least 7:1, except for the following: (Level AAA)

[How to Meet 1.4.6](#)
[Understanding 1.4.6](#)

- **Large Text:** Large-scale text and images of large-scale text have a contrast ratio of at least 4.5:1;
- **Incidental:** Text or images of text that are part of an inactive user interface component, that are pure decoration, that are not visible to anyone, or that are part of a picture that contains significant other visual content, have no contrast requirement.
- **Logotypes:** Text that is part of a logo or brand name has no minimum contrast requirement.

1.4.7 Low or No Background Audio: For prerecorded audio-only content that (1) contains primarily speech in the foreground, (2) is not an audio CAPTCHA or audio logo, and (3) is not vocalization intended to be primarily musical expression such as singing or rapping, at least one of the following is true: (Level AAA)

[How to Meet 1.4.7](#)
[Understanding 1.4.7](#)

- **No Background:** The audio does not contain background sounds.
- **Turn Off:** The background sounds can be turned off.
- **20 dB:** The background sounds are at least 20 decibels lower than the foreground speech content, with the exception of occasional sounds that last for only one or two seconds.

Note: Per the definition of "decibel," background sound that meets this requirement will be approximately four times quieter than the foreground speech content.

Example

Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background.

[Understanding Guideline 1.4](#)

1.4.8 Visual Presentation: For the visual presentation of blocks of text, a mechanism is available to achieve the following: (Level AAA)

[How to Meet 1.4.8](#)
[Understanding 1.4.8](#)

1. Foreground and background colors can be selected by the user.
2. Width is no more than 80 characters or glyphs (40 if CJK).
3. Text is not justified (aligned to both the left and the right margins).
4. Line spacing (leading) is at least space-and-a-half within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing.
5. Text can be resized without assistive technology up to 200 percent in a way that does not require the user to scroll horizontally to read a line of text on a full-screen window.

1.4.9 Images of Text (No Exception): Images of text are only used for pure decoration or where a particular presentation of text is essential to the information being conveyed. (Level AAA)

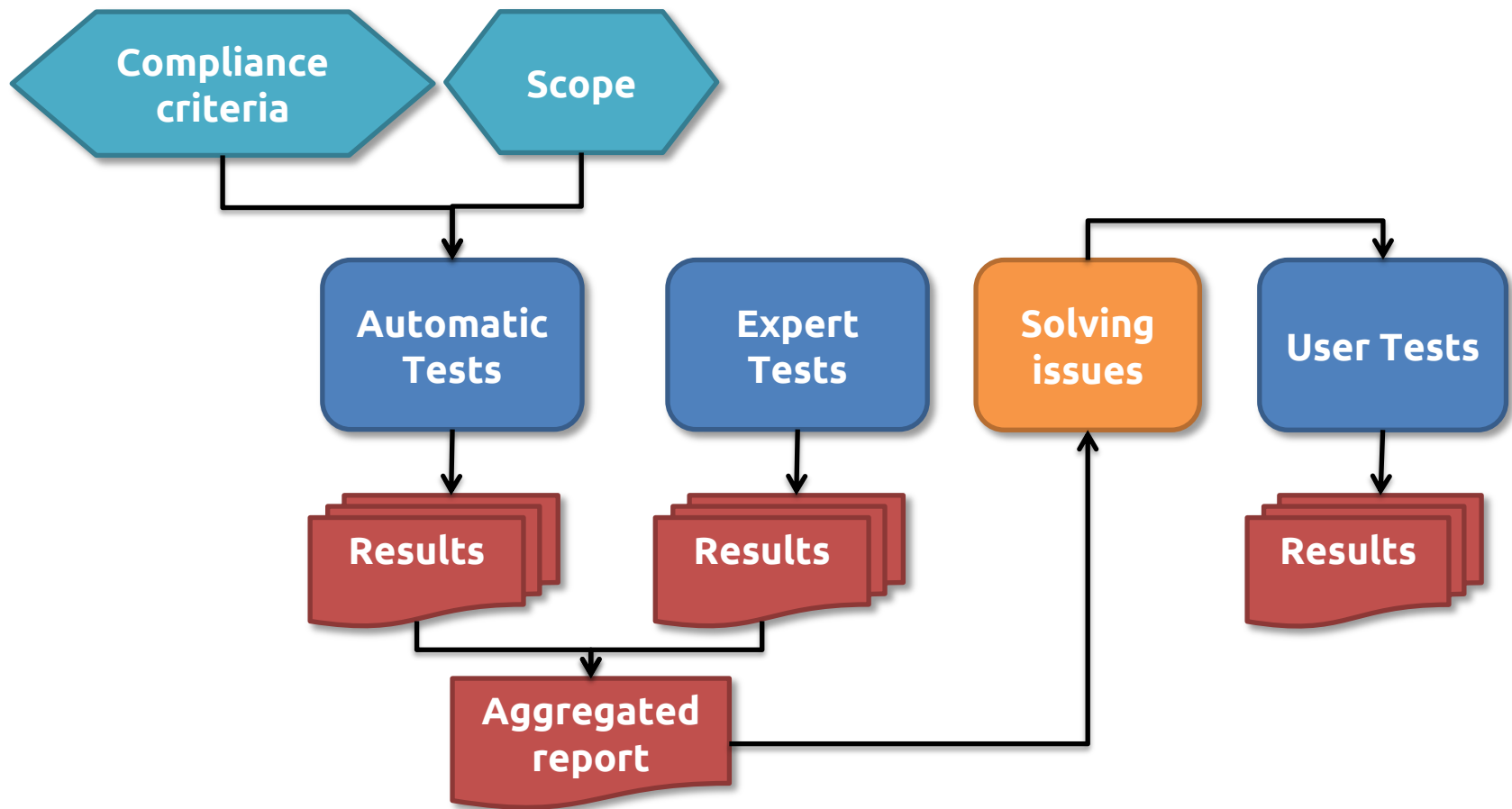
[How to Meet 1.4.9](#)
[Understanding 1.4.9](#)

Note: Logotypes (text that is part of a logo or brand name) are considered essential.

Evaluation tools

- While Web accessibility evaluation tools can significantly reduce the time and effort to evaluate Web sites, no tool can automatically determine the accessibility of Web sites
- W3C does not endorse specific vendor products;
- Overview of Web accessibility evaluation tools
 - <https://www.w3.org/WAI/ER/tools/index.html>

Typical evaluation process



WAI-ARIA

- The last ten years have seen the rise of Ajax, JavaScript, HTML5, and countless front-end frameworks
 - The internet is no longer a place of static HTML pages, but it has become a playground for complex, almost desktop-like web applications, each with their own widgets, controls, and behavior
- Sometimes web development is pushed to the limit... and people with disabilities struggle with these new techniques
- This is not due to disabled JavaScript or insufficient capabilities of current assistive technology (AT)
 - On the contrary, in 2012 WebAIM found that over 98 percent of screen reader users had JavaScript enabled
 - Additionally, ATs like screen readers or refreshable Braille displays are getting better every year

WAI-ARIA

- The problem lies with HTML limited ability to mark up web applications that make heavy use of JavaScript and produce a huge amount of dynamic content
- Four key obstacles can be identified when ATs deal with JavaScript applications
 - Unknown functionality of components
 - Unknown states and properties of components
 - Unreported change of dynamic content
 - Bad keyboard accessibility

WAI-ARIA

- “Web Accessibility Initiative Accessible Rich Internet Applications (WAI-ARIA)
- A technical specification that defines a way to make Web content and Web applications more accessible to people with disabilities
 - W3C Recommendation (3/20/2014)
- Provides attributes for extending HTML markup with roles, states and properties to expose Web applications to Assistive Technologies
- ARIA was designed to be recognized only by assistive technology and does not affect the DOM or the style in any way

WAI-ARIA in 5 steps

1. Alert users to what each element or widget is: the element's role (such as a menu or a tree)
2. Alert the user to each element properties and important relationships (such as "aria-haspopup", "aria-describedby" and other labels)
3. Alert the user to what each element is doing: the element's state (such as "aria-expanded" or "aria-disabled")
4. Alert users to any changes in the element's state
5. Make sure the widget is keyboard accessible and the focus is predictable
 - Interactive controls should receive focus through the keyboard
 - Events can be triggered through the keyboard
 - How to trigger events should be intuitive to the user

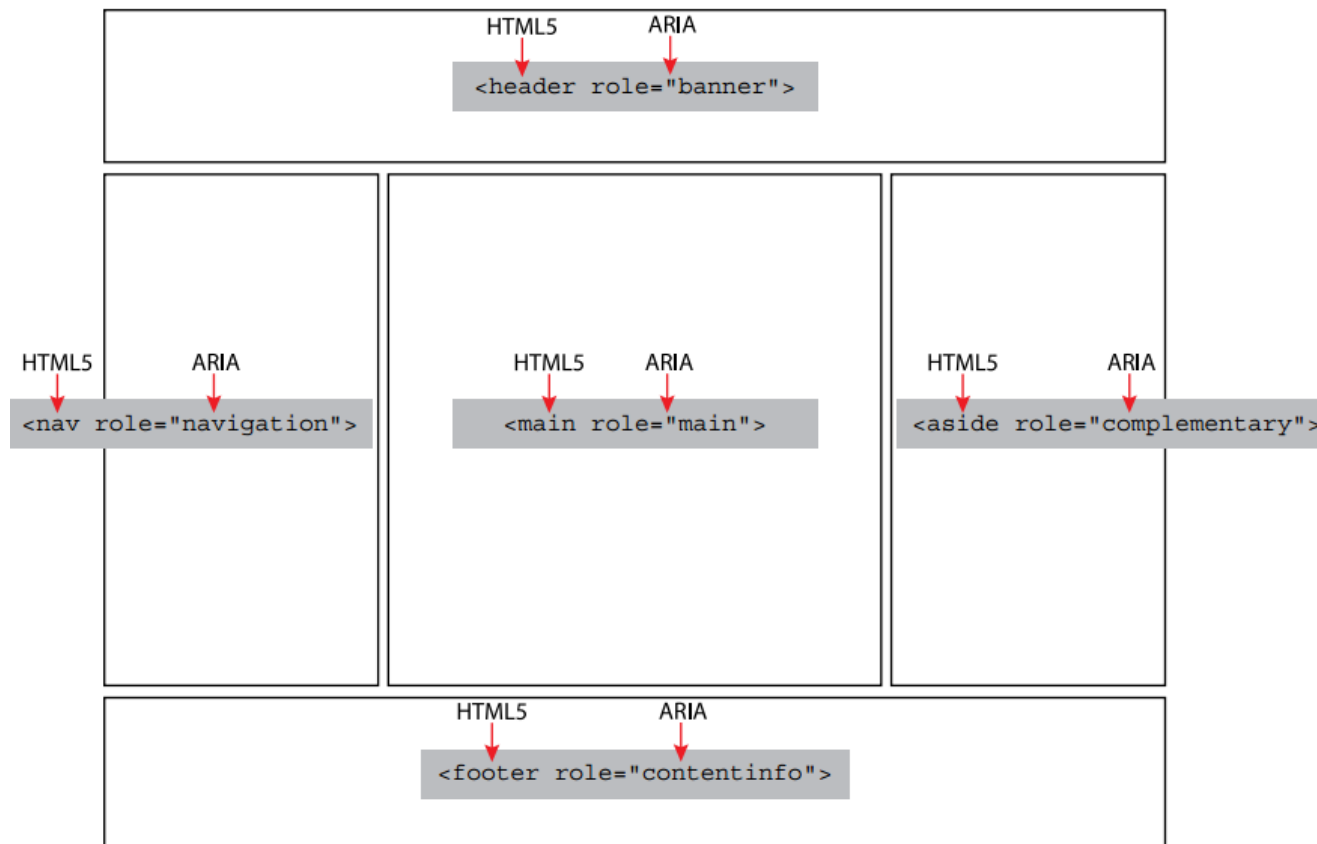
Functionality via Roles

- ARIA provides a rich role taxonomy that enables you as a developer to classify otherwise meaningless tags
- This prepares the tags for ATs by revealing the functionality or the part they play in the overall web document

```
<ul id="myTab" class="nav nav-tabs" role="tablist">  
  <li class="active"> <a href="#home" role="tab"  
    data-toggle="tab">Home</a> </li>  
  <li> <a href="#profile" role="tab"  
    data-toggle="tab">Profile</a> </li>  
  <li> <a href="#articles" role="tab"  
    data-toggle="tab">Articles</a> </li>  
</ul>
```

WAI-ARIA for navigation roles

- HTML5 elements and ARIA roles are complementary
 - Including both of them in your site provides a solid code structure and good navigation around the page



HTML5 semantic tags and ARIA roles

HTML5	Implied ARIA role
<code><header></code>	<code>role="banner"</code>
<code><nav></code>	<code>role="navigation"</code>
<code><main></code>	<code>role="main"</code>
<code><footer></code>	<code>role="contentinfo"</code>
<code><aside></code>	<code>role="complementary"</code>
<code><article></code>	<code>role="article"</code>
<code><section></code>	<code>role="region"</code>

States and Properties

- ARIA states and properties offer the user further information on how to interact with a particular widget
- This is all about revealing the relationships and states of our application to users on keyboards and screen readers
- The W3C provides some detailed WAI-ARIA best practices to follow
 - <https://www.w3.org/TR/wai-aria-practices/>

```
<li class="active">  
  <a id="tab1" href="#home" role="tab" aria-controls="home"  
    data-toggle="tab">Home</a>  
</li>
```

Example: slider

Basic ARIA Slider

Volume: 0%

```
<div class="clearfix">
  <span id="sliderLabel" class="floatLeft">Volume:</span>
  <div id="sliderRail1" class="sliderRailfloatLeft">
    <button class="sliderThumb" id="sliderThumb1" role="slider"
      aria-labelledby="sliderLabel" aria-valuemin="0" aria-valuemax="100"
      aria-valuenow="0" aria-valuetext="0%"></button>
  </div>
  <span id="sliderValue1" class="floatLeft">0%</span>
</div>
```

Live Regions for Dynamic Content

- Discovering dynamically updated content without page reload is one of the biggest obstacles for screen readers, especially in the days of Ajax, Node, and single-page applications
 - How should these be handled? Should the whole page be spoken again? Or should the AT do nothing, risking that the user will miss important updates?
- To fill this gap, ARIA established the concept of live regions that allow ATs to be notified whenever there are changes in that particular part of the document

```
<div id="myTabContent" class="tab-content" aria-live="polite">  
  ...  
</div>
```

Enhanced Keyboard Navigation

- In the old days of HTML4, the only elements that could receive keyboard focus with the TAB key were links and form elements
 - This had some serious implications for people who were forced to operate a web page without a mouse
- ARIA enables every HTML element to receive keyboard focus by extending the “tabindex” attribute
 - Today, this is part of the HTML5 specification

```
<li class="tab active">  
  <a id="tab1" href="#home" role="tab" aria-controls="home"  
    aria-selected="true" data-toggle="tab" tabindex="0">Home</a>  
</li>
```

Legge stanca

- D.M. 9 luglio 2004, formato da 9 articoli, che regola l'accessibilità dei siti web in Italia
 - Definita come la capacità dei sistemi informatici di erogare informazioni fruibili, senza discriminazioni, anche da parte di coloro che a causa di disabilità necessitano di tecnologie assistive o di configurazioni particolari



Soggetti obbligati a rispettare la legge

- Pubbliche amministrazioni
- Enti pubblici economici, aziende private concessionarie di servizi pubblici
- Aziende municipalizzate regionali
- Enti di assistenza e di riabilitazione pubblici
- Aziende di trasporto e di telecomunicazione a prevalente partecipazione di capitale pubblico
- Aziende appaltatrici di servizi informatici

References

- WCAG 2.0 guidelines
 - <http://www.w3.org/TR/WCAG20/#guidelines>
- Web accessibility for designers (by WebAIM)
 - <http://webaim.org/resources/designers/>
- Wave Chrome extension (toolbar)
 - <http://wave.webaim.org/extension/>
- WAI-ARIA
 - <https://www.w3.org/WAI/intro/aria.php>
- Legge Stanca (D.M. 9 luglio 2004)
 - <http://wave.webaim.org/extension/>

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